

Patent Claims

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1. Stress/strain measuring sensor for the continuous monitoring of stress/strain conditions, especially in screwed bolts, **characterized in that** the sensor (1) comprises a first inductor (3) and at least one other element (2), which comprises at least one pressure-dependent first impedance (5) or a second impedance (5') and a second inductor (3'), wherein the second impedance (5') and/or the second inductor (3') are pressure-dependent, so that when the amount of pressure applied to the element (2) is changed, the resonant frequency of an electromagnetic resonating circuit (3, 5; 3', 5') that is formed by impedance (5; 5') and inductor (3; 3') changes.
2. Stress/strain measuring sensor according to Claim 1, **characterized in that** the element (2) comprises at least the pressure-dependent first impedance (5), and that the first inductor (3) and the first impedance (5) form the electromagnetic resonating circuit (3, 5).
3. Stress/strain measuring sensor according to Claim 2, **characterized in that** the element (2) is made entirely or partially of a dielectric material.
4. Stress/strain measuring sensor according to Claim 1, **characterized in that** the element (2) comprises at least the pressure-dependent second impedance (5') and the second inductor (3'), wherein the pressure-dependent second impedance (5') and the second inductor (3') are connected in parallel and form the electromagnetic resonating circuit (3', 5'), so that when the amount of pressure being applied to the element (2) changes, the resonant frequency of the circuit shifts.
5. Stress/strain measuring sensor according to Claim 4, **characterized in that** the element (2) is a piezoelectric or magnetostrictive element.

6. Stress/strain measuring sensor according to one of the preceding claims, **characterized in that** the sensor (1) is designed essentially as a foil, on which the first inductor (3) and contact surfaces (4, 7) for contacting the element (2) are arranged.
7. Stress/strain measuring sensor according to Claim 6, **characterized in that** the foil-type sensor (1) encompasses the element (2) at least partially in the area of the contact surfaces (4, 7).
8. Stress/strain measuring sensor according to Claim 6 or 7, **characterized in that** the section of the foil-type sensor (1) that is equipped with the first inductor (3) projects out over the element (2).
9. Stress/strain measuring sensor according to one of the preceding claims, **characterized in that** the first inductor (3) serves as both coupling and decoupling element.
10. Stress/strain measuring sensor according to one of the preceding claims, **characterized in that** a testing device (14) for checking the stress/strain condition can be coupled, contact-free, to the sensor (1) via the first inductor (3).
11. Stress/strain measuring sensor according to one of the preceding claims, **characterized in that** the element (2) is integrated into a flat washer (10).
12. Stress/strain measuring sensor according to Claim 11, **characterized in that** a second element is arranged in the flat washer (10) to allow comparative measurement to compensate for the effects of temperature and aging.
13. Stress/strain measuring sensor according to Claim 11 or 12, **characterized in that** the flat washer (10) can be positioned between a

mounting assembly (11) and a structure (12) that is connected to said mounting assembly.

14. Method for stress/strain measurement, especially in screwed bolts, **characterized in that** at least one element (2) of a sensor (1) with a first inductor (3), which comprises at least one pressure-dependent first impedance (5) or a second impedance (5') and a second inductor (3'), wherein the second impedance (5') and/or the second inductor (3') are pressure-dependent, is arranged between a mounting assembly (11) and a structure that is connected to the mounting assembly, such that when the amount of pressure applied to the element (2) changes, the resonant frequency of an electromagnetic resonating circuit (3, 5; 3', 5') that is formed by impedance (5; 5') and inductor (3; 3') is changed.

15. Method for stress/strain measurement according to Claim 14, **characterized in that** the element (2) is compressed when pressure is applied, and is released from said compression as the amount of pressure applied is decreased.

16. Method for stress/strain measurement according to Claim 14 or 15, **characterized in that** the electromagnetic resonating circuit (3, 5; 3', 5') projects out over the first inductor (3).

17. Method for stress/strain measurement according to Claim 14, 15 or 16, **characterized in that** the measurement of the resonant frequency of the electromagnetic resonating circuit (3, 5; 3', 5') is accomplished via a contact-free coupling to the first inductor (3).

18. Method for stress/strain measurement according to one of the claims 14 through 18, **characterized in that** a comparative measurement is conducted using a second element, so that shifts in the resonant frequency can be identified.